



Overview and implementation of the CIPM MRA

CIPM MRA-P-11

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1. Introduction

The CIPM MRA is a “Mutual Recognition Arrangement of national measurement standards and of calibration and measurement certificates issued by national metrology institutes”. Certain intergovernmental and international organizations may participate on similar premises.

This policy document (CIPM MRA-P-11) provides a quick reference guide to the current implementation of the CIPM MRA, and is supported by other more detailed policy and guidance documents. It supersedes CIPM MRA-D-02, and together with CIPM MRA-P-12 supersedes CIPM MRA-G-01. It incorporates the requirements set out in CIPM/2005-05, CIPM/2005-06 and CIPM/2009-24.

Each section is written as a stand-alone reference, in such a way that the user can go directly to any step of the process without the need of going through the whole document.

In the CIPM MRA documents, references are given to ISO/IEC 17025 and ISO 17034. These references shall be taken as referring to ISO/IEC 17025:2017 (from 1 June 2021) and ISO 17034:2016.

To align with ISO/IEC directives, the following verbal forms are used in the CIPM MRA documents:

- “shall”: indicates a requirement;
- “should”: indicates a recommendation;
- “may”: indicates a permission;
- “can”: indicates a possibility or capability.

Further details can be found in the ISO/IEC Directives, Part 2.

2. Background

The advent of the global economy demanded an open, transparent and comprehensive scheme to provide information on the equivalence of national measurement services and the technical basis for international trade, commerce and regulatory affairs.

In response to Resolution 2 from the 20th meeting of the General Conference of Weights and Measures (CGPM), the International Committee of Weight and Measures (CIPM) implemented the CIPM MRA.

At its 21st meeting, the CGPM invited:

- *all other Member States of the Metre Convention to participate in the arrangement by giving authority to the director of the designated national metrology institute in their country to sign the arrangement,*
- *all Member States to make every effort to implement the arrangement and to encourage other authorities in their country to recognize the equivalence of national measurement standards and calibration and measurement certificates thereby demonstrated,*
- *all States to use this arrangement as the basis for recognizing the national measurement standards and calibration and measurement certificates of signatory national metrology institutes.*

The CIPM MRA is an important tool for helping National Metrology Institutes (NMIs) and other Designated Institutes (DIs) in the development of their home country's quality of measurements related to industry, health, environment and science.

The CIPM MRA itself and the rules that operate the agreement assure that the process is open, transparent and the information available to all the parties: the NMIs, DIs, their users, accreditors and regulators.

3. The CIPM MRA

The CIPM MRA is the framework through which NMIs demonstrate the international equivalence of their measurement standards and the calibration and measurement certificates they issue. Furthermore, it addresses the dissemination of the SI units through calibration and the provision of reference materials.

The CIPM MRA was drawn up with the following objectives:

- a) to establish the degree of equivalence of national measurement standards maintained by NMIs;
- b) to provide for the mutual recognition of calibration and measurement certificates issued by NMIs; and
- c) to provide governments and other parties with a secure technical foundation for wider agreements related to international trade, commerce and regulatory affairs.

The main mechanisms through which the CIPM MRA achieves these objectives are:

- international comparisons of measurements, known as key comparisons;
- regional comparisons of measurements, known as regional key comparisons;
- supplementary comparisons;
- open peer review of the participants' calibration and measurement capabilities, based mainly on the results of comparisons;
- reviewed implementation of the participants' quality management systems and demonstration of competence.

The outcomes of the CIPM MRA are the internationally recognized (peer-reviewed and approved) Calibration and Measurement Capabilities (CMCs) of the participating institutes declared on the publicly available BIPM key comparison database (KCDB). The KCDB contains:

- a) information on participants of the CIPM MRA;
- b) results of key and supplementary comparisons;
- c) peer reviewed CMCs.

CMCs shall reflect the services available to customers under normal conditions and shall not be artificially subdivided. Only one institute per country can be recognized as holding national responsibility for a specified capability, for taking part in the relevant key comparisons and for submitting the related CMCs.

4. Participation in the CIPM MRA

The CIPM MRA may be signed by the NMIs of the Member States and Associate States and Economies of the CGPM, and certain intergovernmental and international organizations invited by the CIPM.

NMI directors sign the CIPM MRA with the approval of the appropriate authorities in their own country and thereby:

- a) accept the process specified in the CIPM MRA for establishing the database;
- b) recognize the results of key and supplementary comparisons as stated in the database;

- c) recognize the calibration and measurement capabilities of other participating NMIs as stated in the database.

NMIs have the responsibility of maintaining the national measurement standards and disseminate metrological traceability. In many countries, the NMI shares this responsibility with one or more DIs, which like the NMIs operate at the top of the national metrology system. In special cases, an NMI, DI or international organization may subcontract a small part of its calibration, measurement or Certified Reference Material (CRM) certification activities under the CIPM MRA to another competent laboratory. Conditions for subcontracting are described in the policy document CIPM MRA-P-13.

The Regional Metrology Organizations (RMOs) recognized within the framework of the CIPM MRA are responsible for carrying out comparisons and other actions within their regions to support mutual confidence in the validity of the calibration and measurement certificates of their member institutes. NMIs that are not members of RMOs may participate in the CIPM MRA under the provisions of its paragraph 13.

The signatory of the CIPM MRA is the coordinating organization for the State/Economy and takes responsibility for establishing an appropriate mechanism so that CMCs designated at the national level follow the approval process established by the Joint Committee of the RMOs and the BIPM (JCRB) and that they do not overlap between institutes.

Finally, participants of the CIPM MRA are encouraged to make use of the CIPM MRA logo and the “CIPM MRA statement” in order to draw the attention of their customers and other interested parties to the recognition of the validity of the calibration and measurement certificates issued by participants of the CIPM MRA. The guideline for use of the CIPM MRA logo and certificates statement can be found in Appendix A .

5. Metrological traceability

Metrological traceability gives confidence and assurance that measurement results agree with national standards within the statement of uncertainty in measurement. The International Vocabulary of Basic and General Terms in Metrology (VIM) defines metrological traceability:

“property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.”

An institute participating in the CIPM MRA shall establish its metrological traceability route to the International System of Units (SI) via one of the following routes:

- A primary realization or representation of the unit of measurement concerned. In this case, traceability shall be declared to its own demonstrable realization of the SI;
- Another participant having relevant CMCs with appropriate measurement uncertainty published in the KCDB or through calibration and measurement services offered by the BIPM. In this case, traceability shall be declared through the laboratory providing the service.

In exceptional cases, where neither of these two routes can be strictly applied, alternative paths for establishing the traceability to recognized standards shall be proposed to the CIPM through the corresponding Consultative Committee. If approved by the CIPM, any such exception will be available on the BIPM website. The list of exceptions for each field shall be periodically reviewed by the corresponding Consultative Committee.

NOTE 1 In order for a primary realization or representation of the unit of measurement to be considered valid, it shall be approved by the relevant Consultative Committee.

NOTE 2 The institute shall make available a full assessment of the measurement uncertainty budget and the traceability route for its measurement activity when submitting CMCs for intra-regional and JCRB review.

NOTE 3 An institute may use measurement services provided by laboratories accredited by a signatory to the ILAC Arrangement for auxiliary influence quantities that are not part of the main traceability path to the SI and can be shown to make only a minor contribution to the total combined measurement uncertainty of the CMC.

NOTE 4 Traceability route 1 includes institutes using CRMs or high-purity primary chemical reference materials that have been value-assigned by applying their own measurement capabilities as described and recognized within published CMCs.

6. Measurement Comparisons

The technical basis of the CIPM MRA is the set of results obtained through key comparisons. These key comparisons are selected by the Consultative Committees of the CIPM to test the principal techniques and methods in the field. They are carried out by the Consultative Committees, the BIPM or the RMOs. Additionally, supplementary comparisons that meet specific needs not covered by key comparisons are normally carried out by RMOs, but may also be organized by Consultative Committees.

Key comparisons carried out by Consultative Committees or the BIPM are referred to as CIPM key comparisons; key comparisons carried out by regional metrology organizations are referred to as RMO key comparisons; RMO key comparisons must be linked to the corresponding CIPM key comparisons by means of joint participants. The degree of equivalence derived from an RMO key comparison has the same status as that derived from a CIPM key comparison.

Participation from NMIs and DIs from Associates in Consultative Committee comparisons or other activities should be carefully considered by the relevant Consultative Committee on a case-by-case basis, and should only be allowed where this adds scientific or other value related to the effectiveness or efficiency of the relevant activity.

The NMIs that are signatories to the CIPM MRA undertake to put in place appropriate structures within their RMOs so that the RMOs may:

- a) make proposals to the Consultative Committees on the choice of key comparisons;
- b) carry out the RMO key comparisons corresponding to the CIPM key comparisons;
- c) participate in the JCRB; and
- d) carry out supplementary comparisons and other actions designed to support mutual confidence in the validity of calibration and measurement certificates issued by the institutes participating in the CIPM MRA.

Once the results of comparisons are available, the institute declaring the CMC claim has full responsibility to ensure consistency with the comparison results. However, the RMOs should also monitor the impact of the key and supplementary comparison results on the CMC claims for its members.

For the details of the process for comparisons see CIPM MRA-G-11.

7. Quality Management Systems

The CIPM MRA requires that participating institutes establish and maintain a quality management system.

The CIPM MRA does not explicitly specify how its participants review, gain confidence and accept each other's quality management systems. However, the quality management systems established and operated by the institutes shall meet the

requirements of ISO/IEC 17025 for calibration and measurement services, and ISO 17034 for certified reference materials. To confirm the establishment of a suitable quality management system, the RMO shall peer review the quality management system either:

- with the support of an accreditation body fulfilling the requirements of ISO/IEC 17011, and following the ILAC-CIPM guidance on the accreditation of NMIs; or
- directly, without third-party involvement.

In both cases the responsibility for the review lies with the individual RMOs under the auspices of their respective quality system working groups.

The quality management system of the institutes shall cover all their declared CMCs. The quality management system implemented to support the CMCs of the institutes participating in the CIPM MRA shall undergo a full review with a period not longer than five years. This comprehensive periodic review includes examination of evidence for the continued validity and vitality of published CMCs.

Demonstration of competence and capability may require visits and examination of procedures by peers selected by the local RMO. Recommendations for on-site visits by peers and selection criteria for on-site visit peer reviewers are also provided in CIPM MRA-G-12.

The RMOs provide annual summary reports on the status of the quality management system of the institutes participating in the CIPM MRA in their region as part of the regular reports to the JCRB.

The guidelines for RMOs concerning the monitoring and reporting of the operation of quality management systems are described in CIPM MRA-G-12.

8. Calibration and Measurement Capabilities

The CMCs within the CIPM MRA are given in terms of a quantity, a range, and calibration and measurement capability expressed as a measurement uncertainty. CMCs are underpinned by both technical evidence and a quality management system. The technical evidence is mainly the results of key and supplementary comparisons.

While the results of key and supplementary comparisons are the ideal supporting evidence for CMCs, it is not the intention of the CIPM MRA to have a one-to-one correspondence between CMCs and comparisons.

In order for CMCs to be approved for publication in the KCDB they must pass a review in two stages. The first stage is an intra-regional review process designed and conducted by the appropriate Technical Committee (TC) or Working Group (WG) of the RMO of origin. The second stage is an inter-regional review (JCRB review) between the TC/WG of the RMOs organized through the KCDB. The reviews verify the validity of CMCs from the RMOs' points of view and provides the technical confidence required for publication. When all reviewing TC/WG RMOs have indicated their approval of the CMCs, they are published in the open section of the KCDB by the KCDB Office.

TC/WGs play a key role in this process as they conduct the technical review and eventual approval of each CMC submission.

The CMC review processes are carried out through the password-protected website of the KCDB (<https://www.bipm.org/kcdb>). TC/WG Chairs in each RMO can obtain a username and a password from the KCDB Office. Other persons can view this process by visiting the KCDB

Guest account using the guest credentials:

Username: tcguest@BIPM

Password: tcontact

If required, published CMCs may later be modified due to changes in the measurement uncertainty, scope or measurement method, or for editorial purposes.

The details of the CMC review process are described in CIPM MRA-G-13.

9. Resources related to the CIPM MRA

CIPM-D-01, *Rules of procedure for the Consultative Committees (CCs) created by the CIPM, CC working groups and CC workshops.*

CIPM MRA (<https://www.bipm.org/en/cipm-mra/cipm-mra-text/>)

CIPM MRA-P-11, *Overview and implementation of the CIPM MRA*

CIPM MRA-P-12, *Coordination within the CIPM MRA: Consultative Committees, Regional Metrology Organizations, JCRB*

CIPM MRA-P-13, *Participation in the CIPM MRA: National Metrology Institutes, Designated Institutes, International organizations*

CIPM MRA-G-11, *Measurement comparisons in the CIPM MRA: Guidelines for organizing, participating and reporting*

CIPM MRA-G-12, *Quality management systems in the CIPM MRA: Guidelines for monitoring and reporting*

CIPM MRA-G-13, *CMCs in the context of the CIPM MRA: Guidelines for their review, acceptance and maintenance*

JCGM 100:2008, *Evaluation of measurement data – Guide to the expression of uncertainty in measurement (GUM)*

ILAC-CIPM guidance on the accreditation of NMIs, *Joint ILAC-CIPM Communication regarding the Accreditation of Calibration and Measurement Services of National Metrology Institutes*

PG0128E1, *Customs Convention on the temporary importation of scientific equipment* (<http://www.wcoomd.org/en/about-us/legal-instruments/conventions.aspx>)

JCRB directory (<https://www.bipm.org/en/committees/jc/jcrb/>)

KCDB web portal (<https://www.bipm.org/kcdb>)

RMO websites (<http://www.afrimets.org>; <http://www.apmpweb.org>; <https://www.coomet.net>; <https://www.euramet.org>; <https://www.gulfmet.org>; <https://sim-metrologia.org>)

10. List of acronyms

AFRIMETS	Intra-Africa Metrology System
APMP	Asia Pacific Metrology Programme
AUV	Acoustics, Ultrasound and Vibration
BIPM	International Bureau of Weights and Measures
CC	Consultative Committee (for AUV, EM, L, M, PR, QM, RI, T, TF)
CIPM	International Committee for Weights and Measures
CIPM MRA	CIPM Mutual Recognition Arrangement
CMC	Calibration and Measurement Capability
COOMET	Euro-Asian Cooperation of National Metrological Institutions
CRM	Certified Reference Material
DI	Designated Institute
EM	Electricity and Magnetism
EURAMET	European Association of National Metrology Institutes
GULFMET	Gulf Association for Metrology
GUM	<i>Guide to the expression of Uncertainty in Measurement</i> (JCGM 100:2008)
ILAC	International Laboratory Accreditation Cooperation
JCRB	Joint Committee of the RMOs and the BIPM
KCDB	BIPM key comparison database
L	Length
M	Mass and Related Quantities
NMI	National Metrology Institute
PR	Photometry and Radiometry
QMS	Quality Management System
QM	Amount of substance/Chemistry (Fr. <i>Quantité de Matière</i>)
RI	Ionizing Radiation
RMO	Regional Metrology Organization
SI	International System of Units
SIM	Inter-American Metrology System
T	Thermometry
TC	Technical Committee
TF	Time and Frequency
WG	Working Group

11. Revision History

Document and Version number	Date of Issue/ last review	Summary of change
CIPM MRA-P-11 V 1.0	11 January 2021	New document following the CIPM MRA review.
CIPM MRA-P-11 V 1.1	30 March 2021	Predefined Authorization for use of the CIPM MRA logo removed

Appendix A - The CIPM MRA logo and certificates statement

A1 General considerations

Use of the “CIPM MRA Logo” and the “CIPM MRA statement” is optional. The “CIPM MRA Logo” and the “CIPM MRA statement” can only be displayed on the certificates of those calibration and measurement services that are covered by CMCs published in the KCDB. In cases where a small percentage of the items reported in the certificates of the calibration and measurement services are not covered by CMCs published in the KCDB, then those items shall be clearly noted as not being supported by the CIPM MRA.

A CMC is deemed to cover services that meet all of the following criteria:

- a) Use the same instrument type/measurement method as that identified in the CMC, noting that more than one instrument type/measurement method can be listed in one CMC,
- b) Fall within the range covered by the CMC,
- c) Have measurement uncertainty no less than the measurement uncertainty quoted in the CMC, with appropriate treatment, documented in the quality management system, for any methods/instruments listed that are derived, i.e. involve further steps in the metrological traceability chain.

In context of the CIPM MRA, calibration and measurement services are considered as:

- the calibrations delivered by participants of the CIPM MRA in accordance with the requirements of the ISO/IEC 17025;
- the certified reference materials (CRMs) that are produced by participants of the CIPM MRA according to ISO 17034.

A1.1 For the calibration certificates

The CIPM MRA logo and “CIPM MRA statement” can be affixed to calibration certificates, and if so, shall be used together. Requirements on use of the logo and statement are described in Section A2 of this appendix.

If the calibration certificates include statements of compliance or verification against an identified metrological specification or clauses thereof (as allowed by clauses 7.8.3.1 (b), 7.8.4.1 (e), and 7.8.6.2 (a-c) of the ISO/IEC 17025), the CIPM MRA logo and

“CIPM MRA statement” may still be affixed to the certificate. However, this does not imply endorsement of the claim of compliance or verification. Therefore, in these cases the statement described in Section A2 of this Appendix shall be amended by the adding of the following words:

“...The “CIPM MRA Logo” and this statement attest only to the measurement component of the certificate”

However, to avoid confusion, where a statement of compliance or verification is required, the recommended practice is to issue both a calibration certificate (which, provided the requirements in this document are met, may bear the CIPM MRA logo together with the “CIPM MRA statement”) and a separate statement of compliance or verification, without the CIPM MRA logo or the “CIPM MRA statement”.

A1.2 For the certified reference materials (CRMs) certificates

The CIPM MRA logo and “CIPM MRA statement” can be affixed to the certificates for CRMs, and if appropriate on the CRM packages. Requirements on use of the logo and statement are described in Section A2 of this Appendix. The statement shall be amended by addition of the following words:

“...The “CIPM MRA Logo” and this statement attest only to the measurement(s) applied for determining the certified values on the certificate”

A2 Guidelines

A2.1 Use of the CIPM MRA logo

Description of the logo. The logo for the CIPM MRA is:



This logo, designated as “CIPM MRA Logo”, is the exclusive property of the BIPM.

The CIPM MRA logo consists of the image of the Pavillon de Breteuil designed in blue with a yellow arc around it [as represented in the logo of the BIPM which is protected by the World Intellectual Property Organization (WIPO) under the terms of Article 6ter of the *Convention de Paris pour la protection de la propriété industrielle du 20 mars 1883* (révisée)], and the acronym “CIPM MRA” below, which represents the *Arrangement for Mutual Recognition of national measurement standards and for calibration and measurement certificates issued by national metrology institutes drawn up by the International Committee for Weights and Measures*. This acronym is made of the acronym “CIPM”, which designates the International Committee for Weights and Measures, and the term “MRA”, which is the acronym commonly used for Mutual Recognition Arrangement.

A2.1.1. Location and size

- a) Location. It is recommended that the CIPM MRA logo appears on the same page in the certificate of the calibration and measurement services as the logo of the institute. The inclusion of any additional logos representing other organizations remains at the discretion of the institute, but no implication or endorsement of these other organizations by the CIPM MRA shall be made or implied.
- b) Size. It is recommended that the size of the CIPM MRA logo be no larger than the logo used to identify the institute.

A2.2 Use of the “CIPM MRA statement”

The following “CIPM MRA statement” shall also be included on the calibration certificates together with the logo.

This certificate is consistent with the capabilities that are included in Appendix C of the CIPM MRA drawn up by the CIPM. Under the CIPM MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in the KCDB (for details see <https://www.bipm.org/kcdb/>).

NOTE 1 In making a French version it became clear that in French it is necessary to be more explicit than in English. The following is the French text that has also been agreed:

Ce certificat est en accord avec les aptitudes en matière de mesures et d'étalonnages (CMCs) figurant dans l'annexe C de l'arrangement de reconnaissance mutuelle (CIPM MRA) rédigé par le Comité international des poids et mesures (CIPM). D'après les termes du CIPM MRA, tous les laboratoires participants reconnaissent réciproquement la validité des certificats d'étalonnage et de mesurage pour les grandeurs, domaines et incertitudes de mesure mentionnés dans la KCDB (pour plus de détails, voir <https://www.bipm.org/kcdb/>).

The corresponding longer English version is the following:

This certificate is consistent with the calibration and measurement capabilities (CMCs) that are included in Appendix C of the Mutual Recognition Arrangement (CIPM MRA) drawn up by the International Committee for Weights and Measures (CIPM). Under the CIPM MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in the KCDB (for details <https://www.bipm.org/kcdb/>).

A3 Request of authorization for the use of the logo and the statement

- a) Availability. The Director of the NMI, DI, or international organization interested in using the CIPM MRA logo shall send the Director of the BIPM a form entitled "Request for use of the CIPM MRA Logo", duly completed and signed, requesting authorization of the use of the logo. In return, an Authorization for use of the CIPM MRA logo will be granted and an electronic version of the logo will be provided. The institute duly authorized to use the logo will be listed in the CIPM MRA section of the BIPM website.
- b) The authorization for use of the CIPM MRA logo is granted as a non-exclusive right and for only as long as the institute fulfils all the conditions of the CIPM MRA.

- c) The authorization for use of the CIPM MRA logo given to the institute cannot be delegated, subcontracted or otherwise transmitted to any other party.
- d) The CIPM MRA logo is the exclusive property of the BIPM. When signing the form entitled "Request for use of the CIPM MRA logo", the Director of the NMI, DI or international organization undertakes on behalf of her/his institute not to apply for any registration of the CIPM MRA logo anywhere in the world, in any class of use whatsoever, nor shall the institutes assist any other party to do so.
- e) The authorization for use of the CIPM MRA logo is valid in all territories.
- f) Any breach of the terms of these Guidelines may result in the withdrawal of authorization to use the CIPM MRA logo by the BIPM Director.

Request for use of the “CIPM MRA Logo”

I, _____, on behalf of _____, hereby request authorization to use the “CIPM MRA Logo” on the certificates of the calibration and measurement services of my institute in the quantities and ranges listed in our entries in the KCDB. I certify that I agree with the provisions set out in the “Guidelines for use of the CIPM MRA Logo and certificates statement” and that my institute will only make use of the logo as per these guidelines.

Signed _____ Date _____

Name of institute: _____

Institute acronym: _____

Name of the Member State or Associate: _____

Contact Person Name: _____

Address: _____

Email: _____

Phone: _____

